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ABSTRACT

This report was designed to provide information on the effectiveness of the mathematics instructional program in grade 2 in Hawaii, including identification of deficiency areas. The Stanford Achievement Test, Primary Level II, was administered in May 1984 to 12,106 students in grade 2. In general, these students performed better than the national norm population. The report provides both an overall analysis of student performance and an analysis by subtest. Implications and recommendations are given, in addition to the listing of objectives on which students scored lower than desirable. The appendix matches test objectives with Hawaii's objectives or expectations; items not matched are also listed. (MNS)

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PROGRAM ANALYSIS OF GRADE 2 STANFORD ACHIEVEMENT TEST, PRIMARY LEVEL II

Spring 1984 Administration

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FOREWORD

As part of the Department's competency-based thrust, the analysis of test results is being conducted and reported. Performance data from tests and other sources are critical in the educational process and should be used to assist students, improve instruction, and upgrade programs. The efforts to date by teachers, principals and specialists are making significant impact on the achievement of students as indicated by the test results.

For the basic skills early identification and intervention activities, it is hoped that each level within the Department will continue to conduct similar review and analysis of formal data in order that the students of Hawaii may benefit from a solid foundation for all subsequent learning.

Francis M. Hatanaka, Superintendent

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I. Overview

OVERVIEW

A. Purpose

The purpose of this report is two-fold:

1. To provide information on program effectiveness including identification of program deficiency areas which require attention; and

2. To provide a model for subsequent district and school analyses.

It is expected that state, district and school level improvement efforts will be directed at the identified deficiency areas.

B. Background of the Test Administration

The Stanford Achievement Test, Primary Level II, was administered statewide in May, 1984 to 12,106 students as part of the Department's early identification and intervention effort. Based on the Foundation Program Objectives and the attendant Student Performance Expectations, specific attention has been placed on the development of basic skills for learning and effective communication for grades K-2.

C. Approach for Program Analysis

The following framework guided the program planner for mathematics in the analysis process. With minor modification or changes in focus, the framework may be used by schools or teachers in the assessment of test results for use in instructional planning and delivery.

1. How well does the test measure the program efforts? (Curriculum Validity)

    a. How well does the subtest content (items) reflect the major program emphases?
    b. Are there test items that measure what is not taught until later in the school experience?
    c. Are there major emphases for grades K-2 that are not measured by this test?

2. How are the students performing? (Student Achievement)

    a. How well are the students doing statewide?
    b. Are there variations among subtest areas?
    c. Are variations what would have been expected? If so, why?
    d. Are variations consistent across all seven districts?

Each subtest was anaylzed including task description, student performance, implications for program/instruction, and recommendations for improvement.

D. General Summary of Performance

The statewide summary of group stanine results indicate that the second grade students in Hawaii performed better than the national norm population with 84% scoring in the average and above average ranges. This is 7% higher than the national norm (77%).

	Below Average %	Average %	Above Average %
National	23	54	23
Hawaii's Second Graders	16	53	31

II. Grade 2 Administration

Grade 2 Administration

A. Overall Analysis

The Stanford Achievement Test (SAT), Primary Level II, includes three subtests related to the area of mathematics: Mathematics Concepts, Mathematics Computation, and Mathematics Application.

1. Curriculum Validity

Analysis of the SAT indicates that the test is moderately effective in assessing the attainment of the goals, objectives, and performance expectations (there are 18 performance expectations in Grade 2) of the state mathematics program. The test does not measure three performance expectations in the areas of measurement and graphing. Another three performance expectations are measured by only one or two items.

The problem-solving process is a major goal of the mathematics program; however, the SAT measures only part of the total process, the solving of story problems. Approximately 10% of the items measure expectations which are not included in the state mathematics program or which may require performance at a level beyond Grade 2.

2. Student Performance

The results indicate that the second grade students in Hawaii scored in the average range on all subtests. Students scored higher in Mathematics Computation and Concepts than in Mathematics Applications.

SUBTESTS	GROUP STANINE		STANINE SUMMARY					
			BELOW 1 2 3		AVERAGE 4 5 6		ABOVE 7 8 9	
	1982	1984	1982	1984	1982	1984	1982	1984
CONCEPTS	7	7	18%	17%	51%	50%	31%	33%
COMPUTATION	7	7	12%	11%	53%	53%	34%	36%
APPLICATIONS	5	5	26%	27%	54%	53%	20%	20%
(NATIONAL PERFORMANCE IN EACH STANINE GROUP)			23%		54%		23%	

A comparison of the 1982 and 1984 results reveals the following:

Group stanines have remained the same in all subtests with the lowest group stanine (5) reflected in the Applications subtest.

a. For the mathematics Concepts subtest, the percent of students in Hawaii scoring in the average and above average ranges (83%) is higher than the percent of students in the norm population (77%) scoring in the same ranges. This is 1% more than the 1982 results.

b. For the mathematics Computation subtest, the percent of students in Hawaii scoring in the average and above average ranges (89%) is higher than the percent of students in the norm population (77%) scoring in the same ranges. This is 2% more than the 1982 results.

c. For the Applications subtest, the percent of students in Hawaii scoring in the average and above average ranges (73%) is lower than the percent of students in the norm population (77%) scoring in the same ranges. This is 1% lower than the 1982 results.

3. Implications

Second grade students continue to perform better than the norm population of the test in two of the three subtests, Computation and Concepts, and not as well as the norm population in the Applications subtest.

4. Recommendations

Analysis should be made of each of the subtests to identify those items students did not perform well on. Comparison of these items with the performance expectations should be made, reasons for student performance determined, and improvement strategies implemented where appropriate. Although the problem-solving process is not tested fully in the Applications subtest, a priority should be placed on the instructional delivery of the problem-solving process and development of logical thinking to improve overall mathematics performance.

B. Subtest Analysis

The following is an analysis of each subtest relative to the task requirement, student performance in Hawaii as compared to national performance, implications, and recommendations. The student performance comparison is made with respect to the mean p-values in each of the item-grouping areas (each subtest is divided into three or four groups in which the test items are closely related). The p-value, which gives the percent of students answering the problem correctly, is used to determine the local curriculum emphasis. A comparison of local p-values with those of the national norm is helpful in discussing the implications which are drawn from the relationship of performance expectations with the SAT item objectives.

Further study within each of the item-group areas is made for those areas in which the local p-value is lower than the national p-value. Each item with a lower p-value is listed, but only those items considered significantly lower are discussed in the section on Implications. Thus, the sections on Implications and Recommendations will deal primarily with identifying areas for program improvement.

1. Mathematics Concepts

a. Desription of Task

The subtest consists of 35 items which require the student to select an answer from four options. Each item is dictated, but the four answer

options are in print, requiring reading of words, pictures or symbols. Item groups are in four areas: 1) Number, 2) Notation, 3) Operations, and 4) Geometry, Measurement and Graphs.

b. Student Performance

Student performance statewide was high (within the above average stanine range) with a group stanine of 7.

The chart below compares the local and national mean p-values in the item-grouping areas. The results show that students in the State of Hawaii scored higher in Number; Notation; Geometry; Measurement and Graphs; and the same as the national norm in Operations. A comparison between the 1982 and 1984 results shows a slight gain in three of the four item-grouping areas.

MATHEMATICS CONCEPTS ITEM GROUPS	NATIONAL %	HAWAII %		DIFFERENCE	
		1982	1984	1982	1984
NUMBER	58	62	63	+4	+5
NOTATION	60	64	67	+4	+7
OPERATIONS	61	61	61	0	0
GEOMETRY, MEASUREMENT AND GRAPHS	68	72	73	+4	+5

Item analysis indicates that the test objectives where students scored lower were as follows:

(1) Operations:

(a) Indicates that zero added to number equals number (item 16).

(b) Indicates missing term in number sentence which illustrate the communicative property of addition (item 17*).

(2) Geometry, Measurement and Graphs:

(a) Identifies circle with three dots on it (item 10).

Students scored significantly lower on item 17. The p-value for this item was also significantly lower in the 1982 results.

*P-value is significantly lower than the national p-value according to the "Stanford Research Report #10: Interpreting Stanford Item Analysis Reports," Harcourt Brace Jovanovich, Inc., New York, 1975, p. 10.

c. Implications

Although overall student performance was high, second grade students in Hawaii did not do as well as the national norm group on the item involving the commutative property of addition. However, the commutative property is expressed with letters rather than with numbers in the test item. The cause for error may be due to the student's unfamiliarity with the use of letters in expressing the commutative property.

d. Recommendation

Continue to pursue the performance expectations with a closer look at the related specific learner objectives that deal with illustrating the commutative property of addition. Reasons should be determined for students' low performance, and work should begin towards improvement in those areas.

2. Mathematics Computation

a. Description of Task

The subtest consists of 37 items. Items 1-29 are computation algorithms, with five answer options, including the NH (not here) option. Problems involve addition and subtraction of one and two-digit numerals. Items 30-37 consist of number sentences which must be completed by the appropriate symbol (>,<, or =).

Item groupings are in three areas: 1) Knowledge of Primary Facts, 2) Addition Algorithms, and 3) Subtraction Algorithms.

b. Student Performance

Student performance was high (within the above average stanine range) with a group stanine of 7. The chart below compares local and national p-values in the item groups. The results show that the students in the State of Hawaii scored higher than the national norm group in all areas. As compared to the results of 1982, gains are reflected in all three item-grouping areas.

MATHEMATICS COMPUTATION ITEM GROUPS	NATIONAL %	HAWAII %		DIFFERENCE	
		1982	1984	1982	1984
KNOWLEDGE OF PRIMARY FACTS	69	76	77	+7	+8
ADDITION ALGORITHMS	54	64	66	+10	+12
SUBTRACTION ALGORITHMS	38	41	42	+3	+4

Item analysis indicates that students scored as well as or higher than the national norm on all items.

c. Implications

There has been improvement in all three item-grouping areas. Although student performance is high for almost all items, there still is a need to continue improvement efforts in the areas of subtraction and multiplication. Performance in these two areas was the same as or slightly higher than the national norm in 1982 and remains the same as or slightly higher than the national norm in 1984.

d. Recommendation

Continue to pursue the performance expectations of the mathematics program with attention to the instructional strategies related to the specific learner objectives that deal with the subtraction and multiplication algorithms. Reasons should be determined for students' low performance and work should begin towards improvement. Program improvement should continue to include providing students with more varied experiences using the subtraction and multiplication algorithms, and providing teachers with instructional strategies for teaching these algorithms.

3. Mathematics Applications

a. Description of Task

The subtest consists of 28 items. Items 1-14 are story problems dictated by the teacher, and the learner chooses one of five options, which includes the option NH (not here). Items 15-28 require reading of words and symbols, but the teacher prefaces each related group of items (having to do with the same story problem) with additional instructions or questions. There are four and five answer options, not all containing the NH option.

Item groupings are in three areas: 1) Solution of a One-Step Problem, 2) Analysis and Development of a Solution Design, and 3) Measurement and Graphs.

b. Student Performance

Student performance statewide was average in comparison to the national norm with a group stanine of 5.

The chart below compares local national mean p-values in the item-grouping areas. The results show that the students in the State of Hawaii scored lower in two areas, with the largest discrepancy in the Solution of One-Step Problems. As compared to the 1982 results, the 1984 results have remained the same in all three areas.

MATHEMATICS APPLICATIONS ITEM GROUPS	NATIONAL %	HAWAII %		DIFFERENCE	
		1982	1984	1982	1984
SOLUTION OF A ONE-STEP PROBLEM	66	60	60	-6	-6
ANALYSIS AND DEVELOPMENT OF A SOLUTION DESIGN	54	52	52	-2	-2
MEASUREMENT AND GRAPHS	58	58	58	0	0

Item analysis indicates that the test objectives where students scored lower were:

(1) Solution of a One-Step Problem

(a) Adding to find the value of the larger of two quantities when given the smaller value and their difference (item 5).

(b) Subtracting to compare two quantities (item 6*).

(c) Subtracting to find the remainder (item 8*).

(d) Interpreting /each/ as a signal to multiply (items 9*, 10*).

(e) Dividing total into a number of equal parts (item 11*).

(2) Analysis and Development of a Solution Design

(a) Separating extraneous data and subtracting to find how many more are needed (item 7*).

(b) Adding and subtracting in two-step sequence (item 13).

(c) Determining specific rate (items 14*, 18*).

(d) Translating into mathematical sentence (item 28*).

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*P-value is significantly lower than the national p-value according to the "Stanford Research Report #10: Interpreting Stanford Item Analysis Reports, Harcourt Brace Jovanovich, Inc., New York, 1975, p. 10.

(3) Measurement and Graphs

(a) Converting small coin values into cents to find the total (item 4).

(b) Using standard clock units to find amount of time elapsed (item 19).

(c) Subtracting specific amount from given point on a number line (item 20).

(d) Identifying the clock showing specified amount of elapsed time (item 21).

(e) Converting coin values into cents to determine correct change (item 22*).

(f) Comparing prices of two items in price display (item 24*).

Specific items on each of the above areas where students scored significantly lower were items 6-11, 14, 18, 22, 24, and 28. These were the same problems which resulted in significantly lower p-values in 1982.

c. Implications

The stanine summary indicates overall average performance for students in Hawaii. Areas in which students in Hawaii did not do as well as those nationally were specific story problem items involving subtraction, multiplication, division, rate, and money. Almost half of these items where students scored significantly lower required performance which is expected at a higher level. Items 11 and 14 are related to specific learner objectives for grade 5 in the Mathematics Program Guide. Item 11 requires students to divide a two-digit number by another two-digit number. Item 14 can be interpreted as a ratio problem. Item 18 requires skills which are not expected of students until the end of grade 6. Students need to use knowledge of a given rate to solve the problem.

Items 6-10, 22, 24, and 28 are all related to performance expectations of specific computational skills that students are expected to have by the end of the second grade. Since students tended to do well in the computation subtest, it may not be the lack of a specific computational skill that is the cause of error, but difficulty with listening to the problem and computing mentally, or inexperience in applying the problem-solving process.

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*P-value is significantly lower than the national p-value according to the "Stanford Research Report #10: Interpreting Stanford Item Analysis Reports, Harcourt Brace Jovanovich, Inc., New York, 1975, p. 10.

d. Recommendation

Continue to pursue the performance expectations of the Mathematics Program. Reasons should be determined for students' low performance and work should begin towards improvement. Program improvement may include providing students with more experiences involving problem-solving strategies. There are elementary programs which address problem solving in consonance with the Mathematics Program Guide. Some of these programs such as Curriculum Development Associates Mathematics and the Comprehensive School Mathematics Program are being implemented in several schools. A number of textbook series are revising their material to include activities that highlight the heuristics of the problem-solving process. Schools considering improvement options will need to determine if these programs can be used to meet their needs as alternatives or supplements to their existing mathematics program.

The Mathematics Program Guide also provides direction in identifying problem-solving behaviors and strategies for teaching. Schools should investigate to see how these strategies may be used for teaching problem solving within their on-going program. Schools should also look at the available in-service workshops which address this need, and encourage their teachers to participate.

III. Appendix

Grade 2 SAT Item Matches

CONCEPTS

Item #	SAT Objective	Learner Objective (LO) or Performance Expectation (PE)	Grade
1.	Chooses the number which completes a number series.	Identifies and compares commonly used fractions (e.g., ¼, ½) and whole numbers up to 10 and multiples of 2, 5 and 10 to 100.	1 PE 2 PE
2.	Identifies the symbol for the empty set.	No match	
3.	Identifies the exact position of an ordinal number in a line.	Reads, writes, and uses the terms "first, second, third...tenth."	1 LO
4.	Marks a specific date on a calendar.	Measures, reads and compares lengths, temperatures, masses, capacity, times of events, and quantities of money.	3 PE
5.	Marks a specific date on a calendar.	Measures, reads and compares lengths, temperatures, masses, capacity, times of events, and quantities of money.	3 PE
6.	Finds the total value of three coins.	Tells time to the minute, makes change through a half dollar, reads temperature in degrees Celsius.	2 PE
7.	Identifies the numeral represented by a place-value device.	Uses place value to communicate the meaning of and to compute with 2-digit numerals.	1 PE
		Uses whole numbers and commonly used fractions (e.g., ¼, ½) to communicate physical quantities (how many, how much, etc.).	2 PE
		Uses place value to communicate the meaning of and to compute with 3-digit numerals.	2 PE
8.	Identifies the number which is one more than the given number.	Adds and subtracts through 3-digit numbers with regrouping (carrying and borrowing).	2 PE
9.	Chooses a set which is equal to a given set.	No match	
10.	Identifies a circle with three dots on it.	Identifies and compares plane geometric figures in the environment.	1 PE
		Identifies and compares plane and solid geometric figures in the environment.	2 PE

Item No.	Content	Learner Objective (LO) Performance Expectation (PE)	Grade PE/LO
11.	Indicates the number of months that there are in a year.	Names the days of the week and months of the year.	2 LO
12.	Translates a word form of a given number into its Arabic numerals.	Uses place value to communicate the meaning of and to compute with 2-digit numerals.	1 PE
		Uses place value to communicate the meaning of and to compute with 3-digit numerals.	1 PE
13.	Indicates a letter which is made only of line segments.	Sorts plane and solid geometric figures according to their observed properties.	2 PE
		Identifies and compares plane and solid geometric figures in the environment.	
14.	Marks the number name which has the greatest relative value.	No match.	
15.	Determines which of four sets has the greatest number of squares.	Sorts plane and solid geometric figures according to their observed properties.	2 PE
		Identifies and compares plane and solid geometric figures in the environment.	2 PE
		Uses appropriate language, e.g., greater than, less than, and equal to in comparing temperatures, masses (weights), lengths, regions (areas), quantities, and times of events.	1 PE 2 PE
16.	Indicates that zero added to a number will equal the number.	Uses addition and corresponding subtraction facts through sums of 5.	KPE
17.	Indicates the missing term in a number sentence which illustrates the commutative property of addition.	Uses algebraic techniques and describes their relationship to the properties of real numbers.	8 PE

Item No.	Content	Learner Objective (LO) Performance Expectation (PE)	Grade PE/LO
18.	Chooses the number sentence which describes a given operation.	Uses whole numbers and halves, thirds, and fourths to communicate physical quantities.	1 PE
		Uses whole numbers and commonly used fractions (e.g., ½, ¼) to communicate physical quantities (how many, how much, etc.).	2 PE
		Adds and subtracts single digit nos.	1 PE
19.	Selects the number which lies within a given interval.	Orders numbers to 100.	2 LO
		Identifies and compares commonly used fractions (e.g., ½, ¼) to communicate physical quantities (how many, how much, etc.).	2 PE
20.	Solves a problem in elementary logic using the transitivity property.	Uses appropriate language, e.g., greater than, less than, and equal to in comparing temperatures, masses (weights), lengths, regions (areas), quantities, and times of events.	1 PE 2 PE
21.	Identifies the number which is one less than the given number.	Adds and subtracts through 3-digit numbers with regrouping (carrying and borrowing).	2 PE
22.	Interprets a given number sentence in terms of another number sentence whose operation is the inverse of the first.	Checks addition by subtracting and subtracting by adding.	2 LO
23.	Identifies the number which is expressed as the sum of three numbers.	Recalls the addition and subtraction facts through sums of 18.	2 PE
		Adds 3 or more numbers with sums of 18 or less.	2 LO
24.	Translates a word form of a given number into its Arabic numerals.	Uses place value to communicate the meaning of and to compute with 3-digit numerals.	2 PE
25.	Identifies a figure which is not divided into fourths.	Uses whole numbers and halves, thirds, and fourths to communicate physical quantities.	1 PE 2 PE
		Uses whole numbers and commonly used fractions (e.g., ½, ¼) to communicate physical quantities (how many, how much, etc.).	2 PE

Item No.	Content	Learner Objective (LO) Performance Expectation (PE)	Grade PE/LO
26.	Translates a word form of a given number into its Arabic numerals.	Uses place value to communicate the meaning of and to compute with 3-digit numerals.	2 PE
27.	Solves a problem in elementary logic.	No match.	
28.	Chooses the two numbers which complete a number series.	Identifies and compares halves, thirds, fourths; identifies and compares whole numbers up to 10 and multiples of 2, 5, and 10 to 100.	1 PE 2 PE
29.	Identifies the number which is at a particular point on a number line.	Extends counting to at least by threes and fours to 100.	2 LO
30.	Compares data from a bar graph.	Makes bar graphs using symbols to compare groups of things.	2 PE
31.	Compares data from a bar graph.	Makes bar graphs using symbols to compare groups of things.	2 PE
32.	Translates a word form of a given number into its Arabic numerals.	Uses place value to communicate the meaning of and to compute with 3-digit numerals.	2 PE
33.	Selects the odd number.	Discovers special arrangements of objects for even and odd numbers.	2 LO
34.	Interprets a given number sentence in terms of another number sentence whose operation is the inverse of the first.	Checks addition by subtracting and subtraction by adding.	2 LO
35.	Identifies the numeral expressed in expanded notation.	Uses place value to communicate the meaning of and to compute with 3-digit numerals.	2 PE
COMPUTATION			
1.	Adds primary facts to obtain a sum less than 10.	Adds and subtracts single-digit numbers.	1 PE

Item #	SAT Objective	Learner Objective (LO) or Performance Expectation (PE)	Grad
		Recalls the addition and subtraction facts through sums of 18.	2 PE
2	Adds primary facts to obtain a sum less than 10.	Adds and subtracts single-digit numbers.	1 PE
		Recalls the addition and subtraction facts through sums of 18.	2 PE
3.	Adds primary facts to obtain a sum greater than 10.	Adds and subtracts single-digit numbers.	1 PE
		Recalls the addition and subtraction facts through sums of 18.	2 PE
4.	Adds primary facts to obtain a sum greater than 10.	Adds and subtracts single-digit numbers.	1 PE
		Recalls the addition and subtraction facts through sums of 18.	2 PE
5.	Subtracts primary facts with a minuend less than 10.	Adds and subtracts single-digit numbers.	1 PE
		Recalls the addition and subtraction facts through sums of 18.	2 PE
6.	Subtracts primary facts with a minuend less than 10.	Adds and subtracts single-digit numbers.	1 PE
		Recalls the addition and subtraction facts through sums of 18.	2 PE
7.	Subtracts primary facts with a minuend greater than 10.	Adds 1-digit numbers to 2-digit numbers; subtracts 1-digit numbers from 2-digit numbers.	1 PE
		Recalls the addition and subtraction facts through sums of 18.	2 PE
8.	Adds three one-digit addends to obtain a sum less than 25.	Adds three addends each of three digits or less.	3 LO
		Recalls the addition and subtraction facts through sums of 18.	2 PE

Item #	SAT Objective	Learner Objective (LO) or Performance Expectation (PE)	Grade
9.	Adds three one-digit addends to obtain a sum less than 25.	Adds three addends each of three digits or less.	3 LO
		Recalls the addition and subtraction facts through sums of 18.	2 PE
10.	Adds two two-digit addends to obtain a sum greater than 100.	Adds and subtracts through 3-digit numbers with regrouping (carrying and borrowing).	2 PE
11.	Subtracts primary facts with a minuend greater than 10.	Adds 1-digit numbers to 2-digit numbers; subtracts 1-digit numbers from 2-digit numbers.	1 PE
		Recalls the addition and subtraction facts through sums of 18.	2 PE
12.	Subtracts a two-digit subtrahend from a two-digit minuend, with no renaming.	Adds and subtracts through 3-digit numbers with regrouping (carrying and borrowing).	2 PE
13.	Subtracts a two-digit subtrahend from a three-digit minuend, which has a disappearing left digit.	Adds and subtracts through 3-digit numbers with regrouping (carrying and borrowing).	2 PE
14.	Adds primary facts in a horizontal algorithm.	Adds and subtracts single-digit numbers.	1 PE
		Recalls the addition and subtraction facts through sums of 10.	1 PE
15.	Subtracts primary facts in a horizontal algorithm, with a minuend less than 15.	Adds 1-digit numbers to 2-digit numbers; subtracts 1-digit numbers from 2-digit numbers.	1 PE
		Recalls addition and subtraction facts through sums of 18.	2 PE
16.	Finds a missing addend in a horizontal algorithm which has a sum less than 10.	Recalls the addition and subtraction facts through sums of 18.	2 PE
17.	Finds a missing addend in a horizontal algorithm which has a sum less than 15.	Recalls the addition and subtraction facts through sums of 18.	2 PE
18.	Finds a missing addend in a horizontal algorithm which has a sum less than 15.	Recalls the addition and subtraction facts through sums of 18.	2 PE

Item #	SAT Objective	Learner Objective (LO) or Performance Expectation (PE)	Grade
19.	Finds the minuend in a horizontal algorithm.	Recalls the addition and subtraction facts through sums of 18.	2 PE
20.	Finds the subtrahend in a horizontal algorithm.	Recalls the addition and subtraction facts through sums of 18.	2 PE
21.	Finds the minuend in a horizontal algorithm.	Recalls the addition and subtraction facts through sums of 18.	2 PE
22.	Adds two two-digit addends to obtain a sum greater than 100.	Adds and subtracts through 3-digit numbers with regrouping.	2 PE
23.	Adds two two-digit addends to obtain a sum greater than 100.	Adds and subtracts through 3-digit numbers with regrouping.	2 PE
24.	Adds a three-digit numeral and a two-digit numeral and renames tens.	Adds and subtracts through 3-digit numbers with regrouping.	2 PE
25.	Subtracts a two-digit subtrahend from a three-digit minuend, which has a disappearing left digit.	Adds and subtracts through 3-digit numbers with regrouping.	2 PE
26.	Subtracts a two-digit subtrahend from a three-digit minuend, which has a disappearing left digit.	Adds and subtracts through 3-digit numbers with regrouping.	2 PE
27.	Subtracts a two-digit subtrahend from a three-digit minuend, which has a disappearing left digit.	Adds and subtracts through 3-digit numbers with regrouping.	2 PE
28.	Adds a two-digit numeral and a one-digit numeral in a horizontal algorithm and renames ones.	Adds 1-digit numbers to 2-digit numbers; subtracts 1-digit numbers from 2-digit numbers.	1 PE
29.	Adds a two-digit numeral and a one-digit numeral in a horizontal algorithm, and renames ones to obtain a sum greater than 100.	Adds 1-digit numbers to 2-digit numbers; subtracts 1-digit numbers from 2-digit numbers.	1 PE
30.	Adds primary facts or applies the commutative property of addition.	Recalls the addition and subtraction facts through sums of 10.	1 PE
		Uses appropriate language, e.g., greater than, less than, and equal to in comparing temperatures, masses (weights), lengths, regions (areas), quantities, and times of events.	1 PE 2 PE
31.	Adds primary facts.	Adds three addends each of three digits or less.	3 LO

Item #	SAT Objective	Learner Objective (LO) or Performance Expectation (PE)	Grade
		Recalls the addition and subtraction facts through sums of 10.	1 PE
		Uses appropriate language, e.g., greater than, less than, and equal to in comparing temperatures, masses (weights), lengths, regions (areas), quantities, and times of events.	1 PE 2 PE
32.	Subtracts primary facts.	Adds 1-digit numbers to 2-digit numbers; subtracts 1-digit numbers from 2-digit numbers.	1 PE
		Recalls the addition and subtraction facts through sums of 18.	2 PE
		Uses appropriate language, e.g., greater than, less than, and equal to in comparing temperatures, masses (weights), lengths, regions (areas), quantities, and times of events.	1 PE 2 PE
33.	Adds primary facts or applies the associative property of addition.	Adds three addends each of 3-digits or less.	3 LO
		Recalls the addition and subtraction facts through sums of 18.	2 PE
		Uses appropriate language, e.g., greater than, less than, and equal to in comparing temperatures, masses (weights), lengths, regions (areas), quantities, and times of events.	1 PE 2 PE
34.	Adds primary facts or applies the commutative and associative properties of addition.	Adds three addends each of 3-digits or less.	3 LO
		Recalls the addition and subtraction facts through sums of 18.	2 PE
		Uses appropriate language, e.g., greater than, less than, and equal to in comparing temperatures, masses (weights), lengths, regions (areas), quantities, and times of events.	1 PE 2 PE

Item #	SAT Objective	Learner Objective (LO) or Performance Expectation (PE)	Grade
35.	Multiplies primary facts or applies the commutative property of multiplication.	Uses multiplication facts through products of 25.	2 PE
		Uses appropriate language, e.g., greater than, less than, and equal to in comparing temperatures, masses (weights), lengths, regions (areas), quantities, and times of events.	1 PE 2 PE
36.	Multiplies primary facts or applies the commutative property of multiplication.	Recalls the addition and subtraction facts through sums of 18 and the multiplication and division facts through products of 81.	3 PE
		Uses appropriate language, e.g., greater than, less than, and equal to in comparing temperatures, masses (weights), lengths, regions (areas), quantities, and times of events.	1 PE 2 PE
37.	Multiplies using primary facts.	Uses multiplication facts through products of 25.	2 PE
		Uses appropriate language, e.g., greater than, less than, and equal to in comparing temperatures, masses (weights), lengths, regions (areas), quantities, and times of events.	1 PE 2 PE
APPLICATIONS			
1.	Adding to find a total.	Recalls the addition and subtraction facts through sums of 10.	1 PE
		Adds and subtracts single-digit numbers.	1 PE
2.	Adding in a two-step sequence.	Recalls the addition and subtraction facts through sums of 10.	1 PE
		Adds and subtracts single-digit numbers.	1 PE
3.	Subtracting in a two-step sequence.	Recalls the addition and subtraction facts through sums of 10.	1 PE
		Adds and subtracts single-digit numbers.	1 PE

Item #	SAT Objective	Learner Objective (LO) or Performance Expectation (PE)	Grade
4.	Converting small coin values into cents to find a total.	Uses operations of addition and subtraction involving money expressions.	4 LO
5.	Adding to find the value of the larger of two quantities when given the smaller value and their difference.	Recalls the addition and subtraction facts through sums of 10.	1 PE
		Adds and subtracts single-digit numbers.	1 PE
6.	Subtracting to compare two quantities.	Adds and subtracts through 3-digit numbers with regrouping.	2 PE
7.	Separating extraneous data and subtracting to find how many more are needed.	Recalls the addition and subtraction facts through sums of 10.	1 PE
		Adds and subtracts single-digit numbers.	1 PE
8.	Subtracting to find a remainder.	Recalls the addition and subtraction facts through sums of 18.	2 PE
		Adds 1-digit numbers to 2-digit numbers; subtracts 1-digit numbers from 2-digit numbers.	1 PE
9.	Interpreting "each" as a signal to multiply.	Uses multiplication facts through products of 25.	2 PE
10.	Interpreting "each" as a signal to multiply.	Uses multiplication facts through products of 25.	2 PE
11.	Dividing a total into a number of equal parts.	Uses operations of multiplication and division involving money expression.	5 LO
12.	Subtracting in a two-step sequence.	Recalls the addition and subtraction facts through sums of 10.	1 PE
		Adds and subtracts single-digit numbers.	1 PE
13.	Adding and subtracting in a two-step sequence.	Adds 1-digit numbers to 2-digit numbers; subtracts 1-digit numbers from 2-digit numbers.	1 PE
14.	Determining a specific rate.	Searches for and finds ways of obtaining ratios equal to a given ratio.	5 LO
		Solves simple ratio, proportion, and percent problems.	6 PE

Item #	SAT Objective	Learner Objective (LO) or Performance Expectation (PE)	Grade
15.	Reading a tally chart to determine the category of greatest number.	Makes bar graphs using symbols to compare groups of things.	2 PE
16.	Reading a tally chart to quantify a category.	Makes bar graphs using symbols to compare groups of things.	2 PE
17.	Reading a tally chart to find a total.	Makes bar graphs using symbols to compare groups of things.	2 PE
18.	Determining a specific rate.	Searches for and finds ways of obtaining ratios equal to a given ratio.	5 LO
		Solves simple ratio, proportion, and percent problems.	6 PE
19.	Using standard clock units to find the amount of time elapsed.	Compares measurements of time.	4 LO
20.	Subtracting a specific amount from a given point on a number line.	Adds, subtracts, multiplies and divides fractions and integers.	8 PE
21.	Identifying the clock which shows a specified amount of elapsed time.	Compares measurements of time.	4 LO
22.	Converting coin values into cents in order to determine correct change.	Uses operations of addition and subtraction involving money expressions.	4 LO
23.	Using a knowledge of coin values to indicate which item costs a specific amount in a price display.	Tells time to the hour and half-hour, makes change for a quarter, and describes changes on a thermometer.	1 PE
24.	Comparing the prices of two items in a price display.	Uses operations of addition and subtraction involving money expressions.	4 LO
25.	Using a price display to determine correct change.	Uses operations of addition and subtraction involving money expressions.	4 LO
26.	Identifying a point which is marked on a ruler.	Measures the length and mass of objects using standard units, including the metric units.	1 PE
		Estimates and measures the length, capacity, and mass of physical objects using standard units, including the metric units.	2 PE

Item #	SAT Objective	Learner Objective (LO) or Performance Expectation (PE)	Grade
27.	Translating the verbal problem into a mathematical sentence.	Solves problems by organizing and recording observations, looking for patterns, estimating, solving simpler problems, or writing and reading mathematical sentences and computing.	2 PE
28.	Translating the verbal problem into a mathematical sentence.	Solves problems by organizing and recording observations, looking for patterns, estimating, solving simpler problems, or writing and reading mathematical sentences and computing.	2 PE

SAT Primary Level II
Mathematics

Items Not Matched to Grade 2 PEs

	Item #	Description	Grade PE/LO
Concepts	2	Identifies the symbol for the empty set.	-
	3	Identifies the exact position of an ordinal.	1 LO
	4, 5	Marks a specific date on a calendar.	3 PE
	9	Chooses a set which is equal to a given set.	-
	11	Indicates the number of months that there are in a year.	2 LO
	12	Translates a word form of a given number into its Arabic numerals.	1 PE
	14	Marks the number name which has the greatest relative value.	-
	16	Indicates that zero added to a number will equal the number.	K PE
	17	Indicates the missing term in a number sentence which illustrates the commutative property of addition.	8 PE
	22, 34	Interprets a given number sentence in terms of another number sentence whose operation is the inverse of the first.	2 LO
	27	Solves a problem in elementary logic.	-
	29	Identifies the number which is at a particular point on a number line.	2 LO
	33	Selects the odd number.	2 LO
Computation			
	14	Adds primary facts in a horizontal algorithm.	1 PE
	28, 29	Adds a two-digit numeral and a one-digit numeral in a horizontal algorithm and renames ones.	1 PE
Applications			
	1	Adding to find a total.	1 PE

2	Adding in a two-step sequence.	1 PE
3, 12	Subtracting in a two-step sequence.	1 PE
4	Converting small coin values into cents to find a total.	4 LO
5	Adding to find the value of the larger of two quantities when given the smaller value and their difference.	1 PE
7	Separating extraneous data and subtracting to find how many more are needed.	1 PE
11	Dividing a total into a number of equal parts.	5 LO
13	Adding and subtracting in a two-step sequence.	1 PE
14, 18	Determining a specific rate.	5 LO
19	Using standard clock units to find the amount of time elapsed.	4 LO
20	Subtracting a specific amount from a given point on a number line.	8 PE
21	Identifying the clock which shows a specified amount of elapsed time.	4 LO
22	Converting coin values into cents in order to determine correct change.	4 LO
23	Using a knowledge of coin values to indicate which item costs a specific amount in a price display.	1 PE
24	Comparing the prices of two items in a price display.	4 LO
25	Using a price display to determine correct change.	4 LO

PEs Not Addressed

Performance Expectation	Comments
Identifies and compares commonly used fractions (e.g., ¼, ½) and whole numbers up to 100 and multiples of 2, 5, and 10 to 100.	Partial match
Uses place value to communicate the meaning of and to compute with 3-digit numerals.	Partial match
Tells time to the minute, makes change through a half dollar, reads temperature in degrees Celsius.	Partial match by 1 ite
Estimates and measures the length, capacity, and mass (weight) of physical objects using non-standard (arbitrary) units.	No match

Estimates and measures the length, capacity and mass of physical objects using standard units, including the metric units.	Partial match by 1 item.
Reads time, money expressions, and temperatures.	No match
Makes bar graphs of pictures of objects to compare groups of things.	No match
Identifies and compares plane and solid geometric figures in the environment.	Partial match
Sorts plane and solid geometric figures according to their observed properties.	Partial match by 2 items.